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(72) Inventor(s):
Adrian John Shortland
Karen Alexandra Masters

(73) Proprietor(s):
Altro Limited
(Incorporated in the United Kingdom)
Works Road, LETCHWORTH,
Hertfordshire, SG6 1NW, United Kingdom

(74) Agent and/or Address for Service:
Barker Brettell
138 Hagley Road, Edgbaston,
BIRMINGHAM, B16 9PW, United Kingdom

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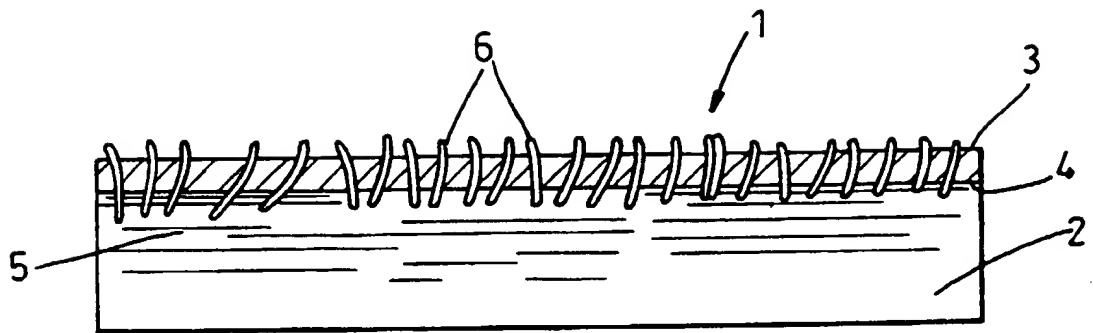


Fig. 1

NON STAIN FLOORING

The present invention relates to the treatment of flooring to improve stain resistance and in particular to flooring with enhanced slip resistance and
5 especially PVC flooring with enhanced slip resistance treated to improve stain resistance and to a method of imparting improved stain resistance to flooring, particularly PVC flooring with enhanced slip resistance.

To provide enhanced slip resistance flooring is generally manufactured
10 having a roughened surface which can be created by embossing the surface or by the addition of particulate material to the main component of the flooring during manufacture.

The roughened surface of the flooring increases the risk of dirt being
15 trapped on the surface. The dirt, depending on its nature, can be compatible with components of the flooring resulting in absorption of the dirt into the surface giving rise to a stain.

It is known to apply a coating to a cured floor with enhanced slip resistance
20 to impart increased stain resistance. However, the application of such a coating generally reduces any surface roughness and thus decreases the slip resistance of the floor.

A particulate material can be sprinkled on top of the coating applied to the
25 cured flooring to impart slip resistance. However the coating applied is generally thin and adhesion of the particulate material is thus reduced. Such floorings generally lose their non-slip properties quickly as the particulate material becomes dislodged from the coating.

The present invention provides a plastics flooring material comprising a base portion which includes a PVC plastisol material, a non-stratified coating portion, imparting improved stain resistance to the flooring material, being positioned in contact with an upper surface of the base portion and creating an upper surface of the flooring material and a first particulate material embedded in the coating portion and partially penetrating the base portion to provide a roughening effect of the upper surface of the flooring material for enhanced slip resistance and resistance to wear.

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We are therefore able to provide a flooring with enhanced slip resistance having improved stain resistance without affecting the effectiveness as the life of non-slip properties which are achieved by the particulate material.

15 The base portion may include a further particulate material dispersed therein. The further particulate material may be aluminium oxide or any other suitable grit. The base portion may contain a pigment. The base portion may include one or more reinforcing supports, the supports are preferably glass fibre reinforced non-woven supports.

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The base portion may be made up of one or more layers of plastics material, preferably up to three layers are envisaged.

The coating portion of the flooring material of the present invention
25 provides improved stain resistance to the flooring material.

30

It is believed that the coating creates a barrier between the upper surface of the flooring material and the base portion thus preventing exposure of the base portion to possible stainants. The coating may further prevent migration of components of the base portion to the upper surface of the flooring material where contact with possible stainants could occur.

The first particulate material being embedded in the coating portion and penetrating the base portion means that the coating portion does not destroy the non-slip properties of the flooring material and the first particulate material is less likely to become dislodged thus prolonging the life of the non-slip properties of the flooring material.

The first particulate material is known as grit and can be any one or more of a number of types of hard particles including silicon carbide, silicas (quartz or coloured/natural sands or flints), aluminium oxide and emery.

The use of a further particulate material throughout the base portion further prolongs the non-slip properties of the flooring material during wear.

The base portion of the flooring material may further contain pigmented PVC chips, quartz chips or other decorative additives to add a decorative effect to the flooring material.

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The coating portion may comprise any conveniently available thermoplastic material or, alternatively, thermoset material.

The present invention further provides a method of making a flooring material comprising a base portion which comprises a PVC plastisol material, a coating portion imparting improved stain resistance to the flooring material and positioned on an upper surface of the base portion to form an upper surface of the flooring material and a first particulate material embedded in the coating portion and partially penetrating the base portion to provide a roughening effect to the upper surface of the flooring material for enhanced slip resistance and protection from wear, the method comprising the consecutive steps of:-

- a) mixing together the components of the base portion;
- 15 b) spreading the mixed components of the base portion on a surface;
- c) carrying out at least one application of a first particulate material to the components of the base portion to at least partially penetrate the base portion;
- d) gelling or curing the base portion;
- 20 e) applying at least one dressing of components of the coating portion in powder form to the base portion;
- f) heating the powder coated base portion to cause the powder coating to form a film.
- 25 Preferably the components of the base portion form a paste when mixed.

The paste is preferably spread on the surface at a controlled thickness, preferably a blade is used to spread the paste at a controlled thickness.

When the powder coated base portion is heated the powder coating preferably melts and flows to form the film.

If the powder coating is a thermoplastic material the application of heat in step f) simply melts the coating and allows it to flow and form a film.

If the powder coating is a thermosetting material the application of heat in step f) cures the thermosetting material.

10 The components of the coating portion are applied to the base portion after it has been cured. In this case the components of the coating will not blend with the base portion to give a stratified effect (i.e. an effect where the components of the coating portion blend into the wet paste to some extent so that some of the components of the coating portion are
15 present in the wet paste, and therefore the base portion of the flooring material, in decreasing amounts as the distance from the surface of the paste, is increased) but the advantages of the coating present on the surface of the base portion will still be achieved.

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The application of the first particulate material to the powder coated base portion allows the particulate material to be pressed by embossing through the coating into the base portion. This is difficult as the base portion has been cured before coating, but it is possible if the base portion has not set completely.

The components of the base portion comprise a PVC plastisol. A further particulate material such as aluminium oxide may be included as a component of the base portion. The PVC plastisol may contain a pigment. The base portion may comprise one or more layers of a plastics material.

A dressing of, for example, silicon carbide may be added to the paste spread at a controlled thickness to confer further slip and wear resistance and give some aesthetic properties. A variety of particles or chips such as PVC chip particles or coloured quartz particles may be added to the paste spread at controlled thickness by, for example, sprinkling the particles from above.

The powder coated base portion is heated, most preferably in an oven, to melt the powder coating.

The product is preferably cured for 1-10 minutes, most preferably 3 minutes, at 150-220°C, most preferably 190°C.

5 Preferably the product is embossed. Embossing preferably takes place while the product is still hot and soft after curing and involves the application of pressure preferably by means of a roller.

10 The components of the coating portion in powder form may be applied by a sprinkle system, a roller pick-up/brush off type system or a spray system.

More than one application of the components of the coating portion in powder form may be necessary.

15 More than one application of the first particulate material is possible.

The presence of the coating portion is likely to reduce water absorption of the flooring material of the present invention. The presence of the coating portion also reduces the amount of volatile organic compounds
20 given off.

The present invention will now be described by means of example only with reference to the drawings in which:

25 **Figure 1** shows a cross sectional view of a known flooring material.

Figure 1 shows a cross section of a portion of flooring material 1 having a base portion 2 and a coating portion 3 wherein the coating portion 3 merges into the base portion 2 where they meet 4 to form a stratified
30 portion 5.

The grit like particulates 6 are embedded in the coating portion 3 and penetrate the base portion 2.

The following examples are illustrative of the present invention:

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a plastisol paste typically comprising:

	Phr (parts per hundred of resin)
PVC powder	100
Plasticiser	30-70
Mineral filler	0-100
Thermal stabiliser	1-3
Pigment	1-6

is produced in a known way. Other additives such as rheology modifiers,
 10 biocides, uv stabilisers etc. may also be used. Grits of the appropriate particle size are added at the required level. The paste produced may then be treated in a variety of ways some of which are covered by the following examples:

15 **Example 1**

Powder is blended with the paste at an addition level of 1% (w/w). The paste is spread coated at a thickness of 2 mm by knife over roller over bed on to a non-woven support. Particles of silicon carbide and coloured quartz
 20 are each scattered on the surface at the rate of 100 gm^{-2} . The paste is then gelled for 3 minutes at 170°C . Powder at the rate of 50 gm^{-2} is applied and further silicon carbide is applied at the rate of 100 gm^{-2} . The product is then fused at 190°C for 3 minutes and embossed.

In example 1 the powder is applied over a cured PVC base layer having quartz and silicon carbide and further powder therein prior to application of further silicon carbide. Stratification of the powder throughout the product will not occur due to the powder being applied to the cured base layer.

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Example 2

Powder is blended with the paste at an addition level of 1% (w/w). The paste is spread coated at a thickness of 2 mm by knife over bed on to a non-woven support. The paste is then gelled for 3 minutes at 160°C. Powder at the rate of 50 gm⁻² is applied and particles of silicon carbide are applied at the rate of 100 gm⁻². The product is then fused at 190°C for 3 minutes and embossed.

15 In example 2 the powder is applied over a cured PVC base layer having no grits therein prior to application of silicon carbide. Stratification will not be achieved for the reasons set out in Example 1.

Example 3

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Powder is blended with the paste at an addition level of 1% (w/w) The paste is spread coated at 2 mm by knife over roller on to a non-woven support. Particles of silicon carbide and coloured quartz are each scattered on the surface at the rate of 100 gm⁻². The paste is then gelled for 3 minutes at 160°C. Powder is applied at the rate of 50 gm⁻². The product is then fused at 200°C for 2 minutes and embossed.

25 In example 3 the powder is applied over a cured PVC base layer having silicon carbide and quartz therein. Again stratification will not be achieved.

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CLAIMS:

1. A plastics flooring material comprising a base portion which comprises a PVC plastisol material, a non-stratified coating portion
5 imparting improved stain resistance to the flooring material being positioned in contact with an upper surface of the base portion and creating an upper surface of the flooring material, and a first particulate material embedded in the coating portion and partially penetrating the base portion to provide a roughening effect of the upper surface of the flooring material
10 for enhanced slip resistance and protection from wear.
2. A flooring material according to claim 1 wherein the base portion includes a further particulate material dispersed therein.
- 15 3. A flooring material according to claim 2 wherein the further particulate material is aluminium oxide.
4. A flooring material according to any preceding claim wherein the base portion contains a pigment.
20
5. A flooring material according to any preceding claim wherein the base portion includes one or more reinforcing supports.
6. A flooring material according to claim 5 wherein the supports are
25 glass fibre reinforced non-woven supports.
7. A flooring material according to any preceding claim wherein the base portion is made up of one or more layers of plastics material.
- 30 8. A flooring material according to claim 7 wherein the base portion comprises up to three layers of plastics material.

9. A flooring material according to any preceding claim wherein the first particulate material is any one or more of a number of types of particles including silicon carbide, silicas, aluminium oxide, emery and flint.

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10. A flooring material according to any preceding claim wherein the base portion of the flooring material contains pigmented PVC chips, quartz chips or other decorative additives to add a decorative effect to the flooring material.

10

11. A flooring material according to any preceding claim wherein the coating portion comprises thermoplastic material or thermoset material.

12. A method of making a flooring material comprising a base portion which comprises a PVC plastisol material, a coating portion imparting improved stain resistance to the flooring material and positioned on an upper surface of the base portion to form an upper surface of the flooring material and a first particulate material embedded in the coating portion and partially penetrating the base portion to provide a roughening effect to the upper surface of the flooring material for enhanced slip resistance and protection from wear, the method comprising the consecutive steps of:-

- a) mixing together the components of the base portion;
- b) spreading the mixed components of the base portion on a surface;
- 25 c) applying at least one dressing of a first particulate material to the components of the base portion to at least partially penetrate the base portion;
- d) gelling or curing the base portion;
- e) applying at least one dressing of components of the coating portion in
30 powder form to the base portion;

f) heating the powder coated base portion to cause the powder coating to form a film.

13. A method according to claim 12 wherein the components of the
5 base portion form a paste when mixed.

14. A method according to claim 13 wherein the paste is spread on the surface at a controlled thickness.

10 15. A method according to claim 14 wherein a blade is used to spread the paste at a controlled thickness.

16. A method according to any of claims 12 to 15 wherein when the powder coated base portion is heated the powder coating melts and flows
15 to form the film.

17. A method according to any one of claims 12 to 16 wherein a dressing of silicon carbide, silicas, aluminium oxide, emery or flint is added to the base portion to confer further slip and wear resistance and
20 give some aesthetic properties.

18. A method according to any one of claims 12 to 17 wherein the product is cured for 1-10 minutes at 150-220°C.

25 19. A method according to any one of claims 12 to 18 wherein the flooring material is embossed.

20. A method according to any one of claims 12 to 19 wherein the components of the coating portion in powder form are applied by a
30 sprinkle system, a roller pick-up/brush off type system or a spray system.

21. A method according to any one of claims 12 to 20 wherein more than one application of the components of the coating portion in powder form takes place.

5 22. A method according to any one of claims 12 to 21 wherein more than one application of the first particulate material takes place.

23. A floor material as claimed in any one of claims 1 to 11, substantially as hereinbefore described or exemplified.

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24. A method as claimed in any one of claims 12 to 22, substantially as hereinbefore described or exemplified.